L 28107-66 EWT(m)/EWP(w)/EPF(n)-2/T/EWP(t)/ETI IJP(c) JD/JG/WB/GD

ACC NR: AT6013786 (N) SOURCE CODE: UR/0000/65/000/000/0029/0042

AUTHOR: Glukhova, A. I.; Andreyeva, V. V.; Glazunov, S. G.; Solonina, O. P.; Nikulova, V. F.

69
68
8+1

ORG: none

TITLE: Study of the corrosion resistance and electrochemical and mechanical properties of alloys of the niobium-titanium system

SOURCE: Korroziya metallov i splavov (Corrosion of metals and alloys), no. 2. Moscow, Izd-vo Metallurgiya, 1965, 29-42

TOPIC TAGS: corrosion resistance, electrochemistry, niobium base alloy, titanium containing alloy, electric potential, mechanical property, metal hydride

ABSTRACT: This is the first in a series of two articles on the same subject: it deals with alloys of the Ti-Nb system containing up to 40% wt. Ti, whereas the second article (same issue, pp 43-58) deals with the same alloys when they contain up to 50% wt. Nb. Mechanical tests of specimens of these alloys showed that the alloys containing 50 and 60% Nb have an ultimate strength of 63 and 68 kg/mm^2, respectively. For the alloy with 70% Nb this strength sharply increases to 78 kg/mm^2, but any further increase in the Nb content is no longer as effective; the increase in hardness follows a similar pattern. Tests of corrosion rate and electrochemical properties in H_2SO_4, HCl, H_3PO_4, HNO_3 and oxalic acids of various concentrations at 40 and 100°C showed that these alloys have a high corrosion resistance in strongly

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L 28607-66

ACC NR: AT6013786

aggressive media and that this resistance increases with increasing Nb content of the alloy, decreases with increasing Ti content and is higher at 40°C than at 100°C. The maximum corrosion of the alloys in acid media was observed for a potential of -100 mv. The corrosion resistance of the alloys is the higher the more positive (from -100 mv upward) is the potential of the metal-acid redox system. In the presence of more negative potentials a hydride layer forms and the metal gets embrittled owing to the diffusion of hydrogen through the metal. A major finding is that the maximum corrosion resistance of these alloys is entirely determined by the corrosion resistance of Nb to a given medium: for example, if the corrosion resistance of pure Nb to a given H_2SO_4 solution at the temperature T is 0.05 g/(m^2-hr) then any Nb-Ti alloy, whatever the proportions between these two elements, will not have a higher corrosion resistance than that; thus, the use of Nb-Ti alloys corrosion-resistant in the corresponding media makes it possible to reduce the consumption of such a scarce and expensive metal as Nb, and besides this hardly affects the mechanical properties of the alloys. Orig. art. has: 11 figures and 3 tables.

SUB CODE: 07,11/ SUBM DATE: 19Jul65/ ORIG REF: 006/ OTH REF: 002

Card 2/2 LC

ACC NR: AT6012373 SOURCE CODE: UR/0000/65/000/000/0082/0088

AUTHORS: Kishkin, S. T.; Polyak, E. V.; Solonina, O. P.; Moiseyev, V. N.; Taranenko, G. N.; Kurayova, V. P.

ORG: none

TITLE: Structural transformations in titanium alloys

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys), trudy soveshchaniya. Moscow, Izd-vo Nauka, 1965, 82-88

TOPIC TAGS: titanium, titanium alloy, electron microscopy, annealing, phase composition, alloy, VT3-1 alloy, VT14 alloy, VT16 alloy, VT15 alloy, VT10 alloy

ABSTRACT: The structural transformations induced by annealing in (α + β) alloys of the types VT3-1, VT14, and VT16, in β alloy of VT15 and in α alloy of VT10, containing an intermetalloidal strengthening agent, were studied. The study was carried out by means of electron microscopy. Electron microscope photographs of specimens annealed at different temperatures are presented. Annealing alloys under different conditions leads to a phase transformation in the alloys. The optimum phase composition that possesses maximum strength and plasticity was found to consist of single α-phase regions and highly dispersed heterogeneous (α + β) phase regions resulting from the decomposition of the metastable β-phase. Thermal stability of alloys may be increased by the addition of aluminum to the alloy. Orig. art. has: 2 figures.

Card 1/1 SUB CODE: 11/ SUBM DATE: 02Dec65

L 38551-66 EWT(m)/T/EWP(w)/EWP(t)/ETI IJP(c) JD/GD

ACC NR: AT6012392 SOURCE CODE: UR/0000/65/000/000/0206/0211

65
63

B+1

AUTHOR: Solonina, O. P.

ORG: none

TITLE: The effect of thermal processing on the properties, structure and phase content of alloy VT3-1

SOURCE: Soveshchaniye po metallokhimii, metallovedeniyu i primeneniyu titana i yego splavov, 6th. Novyye issledovaniya titanovykh splavov (New research on titanium alloys); trudy soveshchaniye. Moscow, Izd-vo Nauka, 1965, 206-211

TOPIC TAGS: phase composition, durability, plasticity, thermal stability, titanium containing alloy, martensite alloy, tempering, alloy composition, titanium alloy, thermal process / VT3-1 martensite alloy

ABSTRACT: A study was performed to measure the structure and phase variations occurring in alloy VT3-1. These variations were contrasted according to the thermal process employed in the making of various test specimens. The following thermal processes were investigated: 1) hardening in water for a duration of one hour at 700--1100C (through 25--50C increments), 2) aging at 100, 200, 300, 350, 400, 450, 500, 525, 550, 575, 600, 650, and 700C with storages of 1, 2, 3, 5, 10, and 25 hours at each temperature. Data plots are shown giving the variation of phase concentrations with these thermal processes. Hardness and strength characteristics are also plotted. Three levels of strength were noted: maximal plastic properties and

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L 38551-66

ACC NR: AT6012392 2

thermal stability were attained through isothermal hardening at 870/650C with air cooling; a middle level of mechanical properties with satisfactory thermal stability is reached through ordinary hardening at 800C with air cooling; high strength characteristics and satisfactory plastic and thermal stability are attained by means of water quenching at about 880C and subsequent aging at about 550C for 5--10 hours. The phase content variations which correspond to the observed variations in mechanical properties are discussed. V. A. Koroleva and I. A. Timonina participated in the work. Orig. art. has: 6 figures and 1 table.

SUB CODE: 11/ SUBM DATE: 02Dec65

Card 2/2

SOLONINA, O.P., KOKHOVA, G.M.

Heat-resistan VT3 and VT3-1 titanium alloys. Titan i ego splavy no.3:79-83 '60. (MIRA 13:7)
(Titanium alloys--Thermal properties) (Heat-resistant alloys)

Alloys of the titanium-zirconium-aluminum system. S/762/61/000/000/004/029

strengthening effect of Al is found to be significantly greater than that of Zr. For example, an alloy with 6% Al had a tensile strength of 95 kg/mm^2, whereas an alloy with 6% Zr attained only 62 kg/mm^2 with nearly identical ductility. However, the elongation with 8 and 10% Zr is more than 20%, whereas specimens with a like Al content are completely brittle. In the ternary Ti-Zr-Al alloys the principal strengthening element is the Al, both at 20 and at 500°C. Optimal creep resistance is attained by alloys containing more than 8% Zr and more than 4% Al. Alloys with 4-8% Al and 6-14% Zr, which manifested the smallest residual elongation (0.12 - 0.25% after 25 hrs at 500° under a 30 kg/mm^2 load), were tested more extensively. Tests on the effect of stepwise quenching and isothermal tempering on the mechanical properties and thermal stability showed increased tensile strength and decreased ductility after quenching than after tempering. Temperature stability was tested by 50-hr soaking at 500°C and mechanical testing at room temperature. Alloys with up to 6% Al were more stable after tempering; alloys with more than 6% Al were more stable after quenching. Ductility was somewhat reduced after aging in all instances. Ductility is improved (although strength is not affected) upon reduction of the forging temperature from 1150° to 900° (test results tabulated). After completion of the subject tests in 1957 the authors became aware of the analogous tests of the U.S. firm Mallory-Sharon (Iron Age, v. 182, no. 17, 1958) on a very similar alloy (881), except that 1% (Nb+Ta) was also present. Additional tests were made

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with an ad-hoc prepared 881 alloy, and it was found that its tensile strength is equal to that of the previously tested alloy 1125, but that its room-temperature ductility is significantly higher. Thus, the (Nb+Ta) addition improves the ductility of the Ti-Al-Zr alloy without impairing its HT characteristics. It is suggested that alloys with 6-8% Al and 8-12% Zr may serve as a basis for HT alloys for operation at 600-700°C temperature. There are 4 figures, 2 tables, 4 references (1 Russian-language Soviet, 2 English-language - of which one in Russian translation, and 1 German).

ASSOCIATION: None given.

S/762/61/000/000/010/029

AUTHORS: Blok, N.I., Glazova, A.I., Lashko, N.F., Solonina, O.P.

TITLE: Phase composition of the BT3-1 (VT3-1) titanium alloy as a function of the aluminum, chromium, molybdenum, and iron content and of its heat treatment.

SOURCE: Titan v promyshlennosti; sbornik statey. Ed. by S.G. Glazunov. Moscow, 1961, 112-120.

TEXT: Ths is a report of an experimental investigation occasioned by a recent decrease in the strength of several Ti alloys, including the BT3-1 (VT3-1), as a result of the introduction of higher-quality sponge Ti. The investigation studied the effect of the basic alloying elements Al, Cr, and Mo on the phase composition and the properties of the resulting alloy. The additional consideration of Fe addition was intended primarily to explore the consequence of its introduction as an unavoidable part of cheaper alloying charges. Heat-treatment methods designed to attain maximum strength and adequate ductility (to replace currently used isothermal anneal) were also explored. It was found that: (1) All of the alloying elements of the VT3-1 alloy stimulate the formation therein of a residual or retained β phase; Cr and Mo enter directly into the β phase; with an increase of their content in the

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Phase composition of the BT3-1 (VT3-1) titanium alloy. .S/762/61/000/000/010/029

alloy the amount of β phase and the concentration of these elements in it increases; Mo appears to be a more powerful β-phase stabilizer than Cr; (b) Al enters the β phase solely as an addition and affects the increase of the amount of that phase only indirectly by reducing the solubility of Cr and Mo in the α-Ti solid solution. (2) With increasing Al and Mo content in the VT3-1 alloy the stability of the β phase is enhanced after prolonged aging at 450°C. (3) Isothermal heat treatment leads to the formation of a relatively small amount of β phase; this explains its impaired strength as compared with that of alloys subjected to a two-stage heat treatment consisting of a quenching and a tempering operation (details tabulated). (4) The difference in the mechanical properties of the two specimen rods of one and the same melt (brittle rupture of one, failure with distinctly plastic deformation of the other) can be explained by the state of the α phase, primarily its form and distribution, and also the size of the primary β-phase particles. There are 2 figures and 4 tables; no references.

ASSOCIATION: None given. 2/2

S/762/61/000/000/014/029

AUTHORS: Glazunov, S.G., Solonina, O.P.

TITLE: Mechanical properties and structure of the BT3 (VT3) and BT3-1 (VT3-1) alloys as functions of their content of alloying elements.

SOURCE: Titan v promyshlennosti; sbornik statey. Ed. by S. G. Glazunov. Moscow, 1961, 142-159.

TEXT: The paper describes 3 test series relative to the effect of (1) O, (2) Ni, and (3) a variety of other alloying elements on the VT3 and VT3-1 Ti alloys. Effect of O: The subject experimental investigation was prompted by the observed lowering in strength of various Ti alloys, for example, VT3-1, upon introduction into the alloy of high-grade sponge Ti which, because of its lower content in Fe, Si, and O, exhibits a tensile strength of 38-50 kg/mm^2 as against 48-60 kg/mm^2 of the less pure Ti employed previously. Earlier tests had shown that in VT3-1 (Ti-5Al-2Cr-1.5Mo) O serves as a stabilizer of α-phase Ti, but that its effect on the plasticity and thermal stability of the alloy beyond 0.2% becomes adverse, primarily through its accelerating effect on the decomposition of the residual β phase. Al, on the other hand, stabilizes the β phase which acting as an α stabilizer (cf. Blok, N.I., et al., pp. 112-120, of the present compendium, Abstract S/762/61/000/000/010/029). The Al enters into the β phase in small quantities (hundredths of a percent) and increases its quantity and, hence, the α-solid-solution solubility of the elements forming the β phase, namely, Cr and Mo, and, ultimately, improves its stability.

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Mechanical properties and structure of the BT3 (VT3).. S/762/61/000/000/014/029

The specific objective of the present project was an investigation of the effect of 0.1, 0.2, 0.3, 0.4, and 0.5% O on the mechanical properties and thermal stability of a VT3-1 alloy with 4, 5, and 6% Al content and a fixed 2% Cr and 1.5% Mo content. 4-kg melts were fused in an arc electrofurnace. Sponge Ti (39 kg/mm^2) was supplied with Al-Cr-Mo ligature and TiO_2. Tension specimens 5 mm diam and Mesnager impact specimens were produced. Standard VT3-1 heat treatment was applied: Heating to 870°C, cooling to 650°, and air-cooling. This procedure ensures optimal plasticity after 100-hr aging at 450°. Short-duration tensile tests were made at 20, 350, 400, 450, and 500°; thermal stability entailed 100-hr soaking of finished specimens at 350-500°, followed by mechanical testing at toom temperature (RT). The RT tests (graphed) indicate that a 1% increase in Al is equivalent to a 0.1% increase in O. A gain of 6-8 kg/mm^2 in tensile strength is accompanied by a reduction in plasticity and notch toughness, most noticeably so with 0.5, 0.4, and 0.2% C and 4, 5, and 6% Al. Thermal-stability tests indicate that with increasing Al content the embrittling O limit decreases; for example, 0.4, 0.3, 0.2% O_2 with 4, 5, and 6% Al, respectively, lead to brittle failure. Uniform thermal stability was obtained with 0.2% O_2 and 5% Al and with 0.3% O_2 and 4% Al (after 100 hrs at 500°); any further increase in %O reduced the embrittlement temperature (450° at 0.4% O_2, 350° at 0.5% O_2). Thus, Al should be regarded as the primary strengthening agent. For example, at 450° a 1% increase in Al content increases the tensile strength by 8-10 kg/mm^2, whereas a 0.1% increase in O_2 content has no appreciable effect.
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Mechanical properties and structure of the BT3 (VT3).. S/762/61/000/000/014/029

Stress-rupture tests, made at 450°C and at a 55 kg/mm^2 stress level at which, according to Specs, VT3-1 should last through 100 hrs, yielded a failure time of 16 and 31 hrs with 4% Al without O_2 and 95 hrs with 0.1% O_2; 0.2% O_2 was required to achieve 100 hrs. 5% Al achieved 100 hrs regardless of O_2 content at 55 kg/mm^2, 6% Al the same minimum at 60 kg/mm^2. Inasmuch as O accelerates the decomposition of the β phase and increases the quantity of embrittling dispersive α phase, Al, and not O, will henceforth be regarded as the primary strengthening element. The Al content of VT3-1 has therefore been increased from 5.2% to 6.2%, and a corresponding change has been effected in the Technical Specs. Effect of Ni in VT3 and VT3-1 alloys. The basic contribution of Ni to the rapid eutectoid decomposition of the β solid solution is briefly summarized (cf. Jaffee, R.J., J.of Metals, v.7, no.2, 1955, 247-252; and Glazunov, S.G., Molchanova, Ye.K., Diagrammy sostoyaniya splavov titana //Phase diagrams of Ti alloys//, Oborongiz, 1954). Anticipating that Ni might improve the high-temperature strength and creep limit of the Ti alloys as favorably as do Cu and Si, tests were made for the mechanical properties and thermal stability of Ti alloys VT3 (Ti-5Al-2.5Cr) and VT3-1 (Ti-5Al-2Cr-1.5Mo) with 0.03, 0.05, 0.075, 0.1, 0.3, and 0.5% Ni. Specimens were prepared by the method employed for the O tests. Sponge Ti with a strength of 41 kg/mm^2 and Al-Cr, Al-Cr-Mo, and Al-Ni ligatures were used. The specimens were annealed by heating to 870°, cooling to 650°, and subsequent air cooling. Thermal stability was tested by room-temperature (RT) tests after 100-hr aging at 300°, 350, 400, 450, and 500°.

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Mechanical properties and structure of the BT3 (VT3)..S/762/61/000/000/014/027

RT tests showed increased strength up to 0.1% Ni, with some decrease in ductility and impact strength. RT tests of HT-aged specimens revealed a decrease in thermal stability with increasing aging temperature. In VT3 the thermal stability (ThSt) is preserved up to 350° regardless of Ni content; at higher T the ThSt decreases, but even at 450° VT3 does not undergo brittle fracture even with 0.5% Ni. VT3-1, however, loses ThSt at 450° with more than 0.1% Ni and suffers brittle fracture with 0.5% Ni. Thus Ni cannot serve as a useful alloying element for VT3 and VT3-1. Microstructural considerations, however, lead to the conclusion that up to 0.03% Ni may be employed as an inoculating addition to achieve a finer microstructure of the two alloys. Effect of V, Cu, Mn, Zr, Sn, and B on the mechanical properties of the VT3-1 alloy. Tests were made with a large number of melts comprising 0.5, 1.0, 1.5, and 3% Mn, 0.5, 1.0, and 1.5% Sn, 0.5, 1.0, and 1.5% Zr, and 0.3, 0.6, 1.0, and 2.0% V, 0.3, 0.6, 1.0, and 2.0% Cu, and inoculating additions of 0.01, 0.05, and 0.1% B. Details of the test procedure are set forth, and test results are graphed. It is concluded that the tensile strength of the VT3-1 alloy at 20°C and 450° is increased most effectively by 0.5 to 1.0% of each of the above-listed elements and up to 0.01% B, with conservation of the ThSt. Conclusion: VT3-1 can be strenghthened most effectively by the addition of Al, which reduces the specific gravity and increases the HT strength of the alloy while conserving its ThSt. The O_2 content should not exceed 0.2%. It is established that up to 0.03% Ni and 0.01% B can be used as structure-refining inoculating additions for VT3 and VT3-1. Up to 0.5% each of

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Mechanical properties and structure of the BT3 (VT3).. S/762/61/000/000/014/029

Mn, Cu, Sn, Zr, and V exert a favorable effect on the strength of the VT3-1 alloy without impairing its thermal stability. There are 10 figures, 2 tables, and 3 references (2 Russian-language Soviet and 1 English-language U.S.). The participation of G. F. Karelina in the work is acknowledged.

ASSOCIATION: None given.

Card 5/5

SOLONINA, O.P.; KURAYEVA, V.P.

Effect of tungsten on the properties and phase constitution of Ti-Al and BT3-1 alloys. Metalloved. i term. obr. met. no.2: 50-52 F '63. (MIRA 16:3)

(Titanium-aluminum alloys--Testing)
(Tungsten)

BOKSHTEYN, S.Z.; KISHKIN, S.T.; NIKISHOV, A.S.; POLYAK, E.V.; SOLOV'YEVA, G.G.; Prinimali uchastiye: ARZHAKOV, V.M.; BULANOV, A.V.; VERTYUKOVA, L.G.; KORABLEVA; MIRSKIY, L.M.; PODVOYSKAYA, O.N.; SAZONOVA, T.N.; SOLONINA, O.P.; TITARENKO, I.I.; RINK, L.P.; KOZLOVA, M.N.; YERMOLOVA, M.I.; MOROZ, L.M.

Aging of plastically deformed alloys. Metalloved. i term. obr. met. no.5:40-44 My '63. (MIRA 16:5)
(Heat-resistant alloys--Hardening) (Deformations (Mechanics))

L 47366-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/JG/WB
ACC NR: AR6028141 SOURCE CODE: UR/0137/66/000/005/I083/I083

37
B

AUTHOR: Glukhova, A. I.; Andreyeva, V. V.; Glazunov, S. G.; Solonina, O. P.

16

TITLE: Investigation of the corrosion resistance and electrochemical and mechanical properties of alloys of the system niobium and titanium

18 27 27

SOURCE: Ref. zh. Metallurgiya, Abs. 5I575

REF SOURCE: Sb. Korroziya met. i splavov. No. 2. M., Metallurgiya, 1965, 29-42

TOPIC TAGS: niobium alloy, titanium niobium alloy, corrosion resistance

ABSTRACT: Niobium alloys with 2—40% titanium have high corrosion resistance in solutions of mineral acids at a temperature of 40C. An increase in titanium content decreases corrosion resistance. Maximum corrosion is observed in acid media at an energy potential of 100 mv. Formation of a hybrid layer and embrittlement of Me occurs at more negative potentials due to diffusion of H in Me. [Translation of abstract] [NT]

SUB CODE: 11/

Card 1/1 afs UDC: 669.293.5

L 28406-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD/JG/WB/GD

ACC NR: AT6013787 (N) SOURCE CODE: UR/0000/65/000/000/0043/0058

AUTHOR: Andreyeva, V. V.; Kazarin, V. I.; Alekseyeva, Ye. L.; Glazunov, S. G.; Golonina, O. P.; Nikulova, V. F.

ORG: none

TITLE: Study of the corrosion resistance and electrochemical and mechanical properties of alloys of the titanium-niobium system

SOURCE: Korroziya metallov i splavov (Corrosion of metals and alloys), no. 2 Moscow, Izd-vo Metallurgiya, 1965, 43-58

TOPIC TAGS: corrosion resistance, electrochemistry, titanium containing alloy, niobium containing alloy, acid, metal heat treatment

ABSTRACT: This is a continuation of a previous investigation (this issue, pp 29-42) with the difference that it deals with alloys of the Ti-Nb system containing up to 50% wt. Nb. Both metals in unalloyed state have a high corrosion resistance, but in certain solutions, e.g. sulfuric and hydrochloric acid solutions, Ti dissolves at a sufficiently fast rate whereas Nb remains corrosion-resistant. Hence, the addition of Nb to Ti should increase the corrosion resistance of Ti. Mechanical tests of these alloys show that as the Nb content increases (up to 8%) the ultimate strength of the alloy increases from 57 kg/mm^2 to 92 kg/mm^2; as the Nb content is further

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L 28406-66

ACC NR: AT6013787

increased above 8%, however, ultimate strength decreases; a similar pattern of variation with Nb content is displayed by plasticity and hardness. In 10, 40, 60, 75 and 94% solutions of H_2SO_4 the alloys at 40°C, whether in hot-forged state or after heat treatment (heating at 920-650°C for 1 hr, water quenching, aging at 450°C for 10 hr with cooling in air), display a general increase in corrosion resistance with increase in Nb content. A similar pattern, on the whole, is observed when the alloys are placed in HPO_3, HCl, HNO_3, and oxalic acid. For the alloys containing upward of 30% Nb, however, aging leads to decomposition of the β-phase, which deteriorates their corrosion resistance. Plotting of the curves of variation in current density as a function of the specified potentials (starting with -0.8 v and ending with +2.2 v) showed that the maximum corrosion rate corresponds to a potential of -0.25 v. As the Nb content of the alloys increases, the critical density of the passivation current decreases and the normal hydrogen potential shifts in the direction of more positive values. The addition of Nb to Ti enhances the corrosion resistance of Ti in solutions of non-oxidizing acids and does not affect the high corrosion resistance of Ti in oxidizing solutions such as 57% HNO_3 or a mixture of HNO_3 and HCl in the ratio of 1:1 or 2:1 at 100°C. Orig. art. has: 9 figures, 5 tables.

SUB CODE: 07, 11, 20/ SUBM DATE: 19Jul65/ ORIG REF: 003/

Card 2/2

L 40030-65 EWT(m)/EWP(w)/EWA(d)/EPR/T/EWP(t)/EWP(z)/EWP(b)/EWA(c) Pe-4

ACCESSION NR: AT5011355 UR/0000/65/000/000/0216/0222

AUTHOR: Blok, N.I.; Vinogradova, Yo. A.; Glazova, A.I.; Kurayeva, V.P.; Lashko, N.F.; Solenina, O.P.

TITLE: Influence of tungsten on the phase composition of Ti-Al and type VT3-1 alloys

SOURCE: Fazovyy sostav, struktura i svoystva legirovannykh staley i splavov (Phase composition, structure, and properties of alloy steels and alloys). Moscow, Izd-vo Mashinostroyeniye, 1965, 216-222

TOPIC TAGS: alloy phase composition, tungsten admixture, titanium alloy, aluminum alloy, tungsten solid solution, alloy mechanical property

ABSTRACT: Alloys of titanium with 6-8% Al and tungsten contents of 0.5, 2.0, 4.0 and 7% were prepared; in addition, to determine the solubility of tungsten in α-titanium, alloys of Ti with 6% Al plus 0.1, 0.2, and 0.3% W were also prepared. The alloys were annealed for 5 hrs. at 800C and cooled in air. The phase composition (x-ray analysis of anodic deposits), mechanical properties, and thermal stability after holding at 400, 450, and 500C for 100 hrs. were determined. The following phases were found in the anodic deposits: β, W (solid solution of titanium in tungsten), and partly the

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L 19430-65

ACCESSION NR: AT5011355

4

α phase, most of which is dissolved in the electrolyte. At 20C, as the tungsten content of the alloys increases, the strength characteristics also increase, and the plasticity declines until brittle failure occurs at 7% W. Hardening is probably due to the formation of the solid solution of titanium in tungsten. The solubility of tungsten in titanium alloys containing 6% Al was found to be less than 0.1%. When chromium or molybdenum was replaced by tungsten in VT3-1 alloys, the diffusional mobility of the atoms in the alloy decreased, giving rise to a satisfactory thermal stability at 500C. "I. V. Polynkova, V. K. Vorotilina, and V. A. Koroleva participated in the experimental part of the work." Orig. art. has: 3 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 17Dec64 ENCL: 00 SUB CODE: MM, SS

NO REF SOV: 005 OTHER: 000

Card 2/2

ACC NR: AP7005752 (A) SOURCE CODE: UR/0126/67/023/001/0063/0072

AUTHOR: Yermolova, M. I.; Solonina, O. P.

ORG: none

TITLE: X-ray diffraction analysis of phase transformations during heat treatment of VT3-1 titanium alloy

SOURCE: Fizika metallov i metallovedeniye, v. 23, no. 1, 1967, 63-72

TOPIC TAGS: diffractometer, titanium alloy, x ray diffraction analysis, phase composition, metal heat treatment, metal aging / VT3-1 titanium alloy, URS-50IM diffractometer

ABSTRACT: The thermally hardenable alloy VT3-1 (5.5% Al, 2% Mo, 2% Cr, 0.4% Fe, 0.2% Si) undergoes changes in its mechanical properties on quenching and aging. Since the reports on the nature of these changes are contradictory, the article elucidates it over a broad range of temperatures, on the basis of x-ray diffraction analysis of forged specimens of the alloy heated to from 200 to 1050°C for 1 hr and cooled in water and subsequently aged for 2 hr at from 100 to 700°C. Debyegrams were taken with the aid of an URS-50IM diffractometer (Cu K_α radiation). Tests of mechanical properties showed that at quenching temperatures of from 700

Card 1/3 UDC: 548.5

to 1100°C ultimate strength changes from 110 to 140 kg/mm^2 and yield point, from 73 to 126 kg/mm^2. On quenching from 850°C the plasticity characteristics increase while the ultimate strength and yield point reach their minimum (Fig. 1). X-ray diffraction analysis of phase

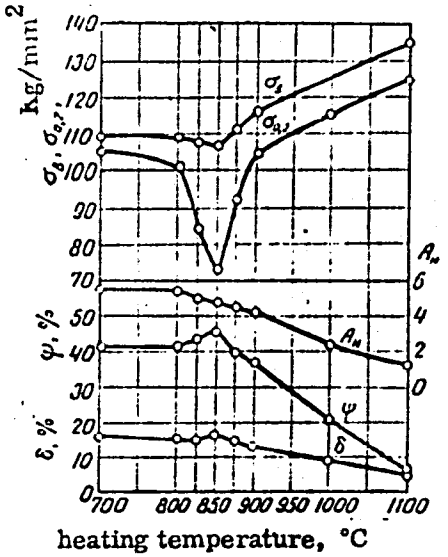

Fig. 1. Variation in mechanical properties of VT3-1 titanium alloy water-quenched from various temperatures

ACC NR: AP7005752

transformations explains these changes: the drop in ultimate strength and yield point following quenching from 850°C is due to the appearance of the metastable phase α''. The increase in strength and decrease in plasticity following quenching from the temperature exceeding the temperature of $\alpha + \beta \rightarrow \beta$ transformation is due to the formation of the α'-phase. Aging at 450--500°C of the alloy quenched from 800-1050°C leads to a sharp increase in hardness and decrease in plasticity. The decompostion of the metastable phases (β, α'', α') at 300-600°C is accompanied by a redistribution of alloy elements which leads to a high saturation of the β-phase with Cr, Mo, Fe at aging temperatures of 450-500°C. The temperature region of existence of the supersaturated β-phase coincides with the maximum hardness of the alloy (470 kg/mm^2). These findings indicate that the hardening of the alloy during its aging is not due to the ω-phase but rather to the decomposition of the metastable phases β, α'', α' and the formation of sectors with disperse hetero-phase structure. This information is of practical significance: since the VT3-1 alloy is used as the material of work-parts performing at temperatures of up to 450°C, using this alloy in quenched state may lead to an increase in the hardness and a decrease in the plasticity of the metal. The conducted analysis of phase transformations demonstrates the need to introduce the operation of aging following quenching from temperatures higher than 450-500°C. Following quenching from 880°C the optimal aging regime is 550°C for 5 hr; this makes it possible to increase strength by 10-20 kg/mm without detriment to plasticity. Orig. art. has: 8 figures, 2 formulas.

SUB CODE: 20, 11/ SUBM DATE: 08Jan66/ ORIG REF: 016/ OTH REF: 003

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SOLONI[illegible]KIN, V.I.

In support of further improvement in the living conditions of the family. Gor.khoz.Mosk. 35 no.9:26-28 S '61. (MIRA 14:10)

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(Moscow--Service industries) (Moscow--Stores, Retail)

15-57-3-3349

Translation from: Referativnyy zhurnal, Geologiya, 1957, Nr 3, p 130 (USSR)

AUTHORS: Soloninko, I. S., Agafonova, T. M.

TITLE: Light-Colored Labradorite from Vas'kovichi and Mezherichka in Volynskaya Oblast' (O svetlom labradorite sela Vas'kovichi i Mezherichki na Volyni) (in Ukrainian)

PERIODICAL: Nauk. Zap. Kyyivs.'k. un-ta, 1956, Vol 15, Nr 2, pp 129-135

ABSTRACT: South of Korosten' on the Uzh River and on its left-hand tributary, the Shesten', three areas are found where light-colored labradorites are exposed: 1) the right bank of the Shesten' River, near Vas'kovichi; 2) the right bank of the Uzh River, at Mezherichka; and 3) the left bank of the Uzh River, in the "Krutaya Izluchina" sector. The physical and mechanical properties of the labradorites from the "Krutaya Izluchina" sector and from Vas'kovichi are given (see Table). Experiments showed that the light-colored labradorites

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Light-Colored Labradorite (Cont.)

Name of locality	Specific gravity	Bulk weight	Crushing limit when dry kg/cm^2	Crushing limit after soaking kg/cm^2	Porosity	Water absorption
Krutaya Izluchina	2.69	2.63	800	650	1.10	0.30
Vas'kovichi	2.72	2.66	785-1179	undet	0.40-0.80	0.11-0.14

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S. P. Sh.

YEREMENOK, P.L., kand.tekhn.nauk; YEKSAREV, A.D., arkhitekt; KOMTSHEV, A.V., inzh.; ANTONOV, P.V., inzh.; KHUTORYANSKIY, D.L., inzh.; SOLONINKO, I.S., kand.geol.-minerl.nauk; KOZAKOV, A.I., inzh., red.; MOISEYEVA, N.V., otvetstvennyy za vypusk

[Specifications for making, designing, and using sawed limestone wall blocks] Tekhnicheskie ukazaniia na proizvodstvo, proektirovanie i primenenie v stroitel'stve krupnykh stenovykh blokov iz pil'nykh izvestniakov. Kiev, Biuro tekhn.pomoshchi NIIIK ASiA USSR, 1958. 82 p. (MIRA 12:2)

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(Building blocks) (Limestone)

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Keramzit raw material. Ibid.:149-157

Perlite raw materials. Ibid.:167-174

(MIRA 18:6)

SOLONINKO, I.S.; MOKRENKO, A.Yu.

Vermiculite is a valuable building material. [Pratsi] Inst. geol. nauk AN URSR. Ser. geol. rod. kor. kop. no.1:175-179 '63. (MIRA 18:6)

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(Dnepropetrovsk Province--Granite)
(Marx, Karl, 1818-1883--Monuments)

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